TRW SPACE TECHNOLOGY LABORATORIES
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National Aeronautics and Space Administration
Goddard Space Flight Center
Glen Dale Road
Greenbelt, Maryland

NASA CR71179

Attention: Mr. M. Schach
Code 633

Subject: Monthly Progress Report
Period Ending 1 January
Contract NAS5-3805
Report No. 4161-6019-R0000

I. Progress in This Report Period

Measurements of defect introduction rates and annealing characteristics of the $E_v + 0.3$ ev level in p-type silicon are continuing. Particular emphasis at this time is on bismuth doped n-type silicon due to the difference in binding energies between bismuth doped and phosphorus doped silicon. It is hoped that the observed defect energy level, as determined through Hall effects measurements, will be measurably different than observed for phosphorus doped silicon in order to obtain some quantitative information concerning the physical defect configuration of the $E_c - 0.4$ ev level.

Room temperature pulsed photoconductivity measurements on 10 ohm-cm p-type silicon have indicated lifetimes of the order of 3 to 5 microseconds. Considering 10 ohm-cm material from diffusion length measurements, one would expect lifetimes of the order of 25 microseconds. Critical analysis of the experimental techniques have failed to indicate the reason for the observed disagreement in lifetime. Similar differences exist in n-type materials leading one to suspect the validity of the equation $L = (D\tau)^{1/2}$ as it is being applied here. Further efforts to resolve this problem have been set aside at this time in favor of continuing with the principal objective of measuring lifetime as a function of temperature to obtain the recombination energy level via this technique. The uncertainty of absolute lifetime will not affect the Hall, Shockley-Read analysis which is used to obtain the energy level. We do feel, however, that further effort to determine the reason for the observed inconsistency in lifetime should be expended.

Initial experiments using the Q-switched neodymium doped glass laser system for pulsed photoconductivity experiments have been performed and are very encouraging. The principal advantages of this system are the complete absence of any RFI which results in extremely clean data and the very high injection levels available for the very short lifetime measurements. It is probable that the bulk of our pulsed photoconductivity work will be performed with the laser rather than the pulsed Van de Graaff because of its noise and injection level limitations.

II. Anticipated activities During the Next Report Period

The Hall effects energy level measurements will be continued. In addition, temperature dependent lifetime measurements of electron irradiated p-type silicon will be performed to determine the recombination energy level.

III. Manpower Expended in This Report Period

MANPOWER EXPENDITURES
NAS5-3805

Period 1 December - 2 January

	TOTAL
J. R. Carter	106
R. G. Downing	28
H. Flicker	112
Total	246

Respectfully submitted,

R. G. Downing
Project Manager

Approved:

for J. M. Denney, Director
Solid State Physics
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RGD:caa